The Mining Journal
AND COMMERCIAL GAZETTE.

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WEST CORK MINING COMPANY.

The proceedings of this company have very naturally attracted public attention, as well as created a considerable sensation among the shareholders, from the nature of the alleged abuses with which certain of the directors are charged, and the proceedings instituted by some of the principal shareholders in the Court of Chancery, it being stated that the *purchase*-money, or rather, that charged for the *lease* of the mines, viz. 165,000*l.*, is a gross fraud committed on the proprietors at large, the property in question never having been valued at a sum exceeding 20,000*l.* It will be in the recollection of our readers, and particularly in that of the shareholders, that in the month of April we directed attention to the accounts of the company, and the misapplication of its funds: we then clearly demonstrated from the printed accounts presented at the half-yearly meetings, that the directors were not in a position to declare a dividend, that their acts in so doing were in direct violation of the Act of Parliament, that the expenses of management were excessive, and that deception had been practised, which, indeed, required only an investigation of the accounts to prove.

When the subject of raising additional capital was agitated, and measures adopted to effect that object, we drew the attention of the proprietors to facts, which we have reason to believe had in part the desired effect as rendering them more cautious, in placing any additional funds at the disposal of directors who had so betrayed the trust reposed in them. That we shall be borne out in the assertions we have made, and the inferences we have drawn, will, we imagine, be admitted by every one who will temperately and dispassionately look into the accounts we shall submit on the present occasion—and that we should have been assailed, and threatened with legal proceedings, for having merely performed our duty, in exposing deceptive practices, alike injurious to the shareholders, as they are calculated to seriously affect the mining interests, does not at all surprise us. We were, and are, fully prepared for such a course being pursued by the parties, but we have still our doubts whether they possess the hardihood to submit to a court of law the facts on which a jury would be called on to decide. We shall not dwell on this point—there is, however, a duty we owe to our subscribers: there is one we owe to ourselves. Having been the means of directing attention to the affairs of the company, and therefore it may be fairly assumed, the origin of the *exposé* about to take place, it is right we should submit to our readers, and more particularly to the shareholders, the data on which our opinions were formed, and at the same time afford them an opportunity of impartially judging of the rectitude of the course we have pursued, as well as being put in possession of facts which they cannot arrive at, we are inclined to believe, through any other channel.

In order that we may not be considered as having arrived too hastily at conclusions, and that others may possess the means of drawing deductions from those sources from whence we acquired our information, we shall submit the terms of the prospectus issued at the formation of the company—of that circulated on the Act being obtained—and to these we shall append the half-yearly financial statements presented at the several meetings, with a balance-sheet or abstract of the ledger, made up to 30th June last, and which becomes the more necessary, as we are informed the care of the books and accounts are now confided to the managing director. The clauses of the Act of Parliament which affect the interests of the proprietors, we shall in like manner cite, and offer some remarks on them, with one or two extracts from our preceding numbers, and having with some labour collected information on which we believe every dependence may be placed, shall at once introduce the documents to which we have adverted, to the attention of our readers.

We shall first proceed to consider the terms on which the company was formed, taking the several prospectuses issued, both antecedent and subsequent to the passing of the Act of Parliament.

Referring to one now before us, bearing date February, 1834, it may not be amiss to make one or two extracts, having reference to the value of the property, the terms on which such was acquired, and the provisions for raising the capital. The property is herein described as "extending at intervals, a distance of thirty miles along the southern coast of the county of Cork," "the very rich deposits" consisting of copper, manganese, and slate—to work which, very little outlay is required for machinery. The quality of the copper ore, we are assured by the prospectus, is of extraordinary richness, some of the ore analyzed by R. Griffith, Esq. having been found to contain fifty-five and a half per cent. of copper, which, at the standard of 130*l.*, is stated to be worth 69*l.* per ton. Robert Frazer, Esq., and Mr. Adam Murray, who had "also made reports upon the mines in question, all agree as to the extreme richness and abundance of the copper, and as to the peculiar facility with which it may be extracted."—"The manganese," the prospectus continues, "is perfectly inexhaustible, and the cost of raising and exporting it does not exceed 3s. 6d. per ton, exclusive of freight, which is trifling. The quality is equal to the best Cornish manganese, and the cargoes can be readily disposed of at Liverpool and other ports, at prices varying from 7*l.* to 10*l.* per ton. This fact is proved by reference to the Liverpool *Price Current*." The slate is also stated to be of very superior quality.

The acquisition of this property is thus clearly defined in the prospectus:—"It is proposed for effectuating the purposes herein described, to raise the sum of 165,000*l.* (*being the purchase money for the above mines*), by shares of 50*l.* each. A sum of not less than 25,000*l.* of the above purchase-money will be allowed to remain in the hands of the company for three years (without interest), to be applied to the working of the mines." A deed of settlement is to be prepared, for carrying the objects of the company into effect, and the prospectus thus concludes:—"Preparatory arrangements enable the directors immediately to commence effective operations: and, it is confidently expected, that a dividend will be declared in July next. The subsequent dividends will be declared quarterly." A second prospectus, bearing the same date, contains a like statement, and varies only, we believe, in the names of the directors. Let us now see how these terms are adhered to; but, perhaps it will be better first to make some extracts from, and remark on, a third prospectus, dated 30th June, 1834, circulated immediately after the passing of the Act, which bears date the 27th of that month. Here, for the first time, we learn, that instead of a deed having been prepared, as contemplated by the prospectuses issued on the formation of the company, an Act of Parliament, and one of an extraordinary nature, as will be seen, has been obtained—the capital of 165,000*l.* is increased to 220,000*l.*—new shares are to be issued, and "the directors having commenced operations confidently expect to be enabled to declare a dividend in August or September." The increase of capital is thus reported to in the document from which we quote:—

"It was originally proposed, for effecting the purposes hereinafter set forth, to raise the sum of 165,000*l.* by shares of 50*l.* each, 15*l.* to be paid as a first deposit, and the remainder by subsequent instalments; but no instalment was to be called for at less than two months' distance, nor any to exceed 10*l.* per share. In pursuance of a power given by the Act passed for incorporating the company, this capital has been increased to the total amount of 220,000*l.*; and the 55,000*l.* thus added to the capital first stated, will, in a similar manner, be raised by the immediate issue of fresh shares of 50*l.* each, on which also 15*l.* will be required as a deposit, and the remainder by instalments, similarly regulated. Accounts of the operations of the company will be reported quarterly, and exhibited at the offices of the company, Salvador-house, Bishopsgate."

Now, it will be apparent to the shareholders, that by the first prospectus the capital was confined to 165,000*l.*—the *purchase-money* for the mines—no increase of capital was contemplated or provided for—the money to be raised was sufficient for the purchase only, and the working capital was confined to the 25,000*l.*, forming part of the purchase-money, which was to remain in the hands of the company for three years, the directors confidently anticipating early dividends. In four months afterwards we find, an Act has been obtained, and the capital increased to 220,000*l.*; the 55,000*l.* so added to the original capital, it being the intention of the directors to raise "by the *immediate* issue of fresh shares of 50*l.* each."

It appears somewhat singular, that in the last prospectus issued, being the one subsequent to the passing of the Act, although the words of those previously circulated, so far as relates to the value of the property, the abundance of minerals, and their richness, are strictly adhered to, the particular paragraph having reference to the *purchase of the mines*, is very curiously omitted.

It is thus clear, that a deviation (whether warranted or otherwise we are not prepared to say) has been made from the original intentions and the regulations laid down on the formation of the company. The capital of 165,000*l.* is, we find, increased to 220,000*l.*—a deed of settlement changed into an Act of Parliament—and the purchase of the mines becomes only a right to work under lease for the term of sixty-three years. How the latter change could be effected without any alteration taking place in the price, it appears to us can only be explained by the managing-director, who, in this case, we should imagine, forgot his duties, and the interests of the company, while he consulted those of Lord Audley, for whom he acted as agent. We can well imagine the difficulty in which that gentleman was placed; and here is a practical illustration of the truth of the old adage, "that no man can serve two masters." However, if report speaks truly, he has served *himself*, and perhaps, after all that, may, in his estimation, be the most important.

With regard to the abundance and richness of the ores, if we are to give credence to the prospectus—if we are to believe the managing-director (which we are, however, bound to confess we do not), then, the mines of the "West Cork Mining Company" must stand pre-eminent, and the ores of Cuba, of Chili, and of Cornwall, must give way to the produce of Ballydehob. The words of the prospectus, after remarking on the average produce of the County of Cornwall, for the past twelve months, having been quoted at 7½, and those sold at the port of Swansea, at 8½, are—"Thus it appears that the *average* produce of copper from the ores sold at those markets, *which received none from the mines* of the West Cork Mining Company, scarcely exceeds that afforded by the poorest ore belonging to it." Now, without detracting from the general good quality of the ore produced from the mines of the West Cork Mining Company, it may be remarked, that of the ores sold by that company at Swansea, on December 2d, eleven tons gave only a produce of two and a half, and fetched a price of 1*l.* 14s. per ton; and, on February 24th, eight tons of ore were also sold, yielding but two per cent. produce, the price per ton being only 1*l.* 5s. 6d. One ton (well picked we imagine) having, however, obtained 43*l.* 14s., and the average price being about 9*l.* 9s. 6d. per ton, which may be considered a good average, but far from the price quoted in the prospectus, or as being at all extraordinary.

The introduction of the names of the gentlemen already mentioned, and that of Mr. J. R. Bakewell, in the last prospectus, appears to have been made with the object of giving colour to the transaction, so far as the amount charged for the mines. The natural assumption on the part of the shareholders must have been, that it was on the reports of those gentlemen the purchase had been made, and which alone could have justified the high price demanded for mines previously abandoned for a nominal consideration by the Mining Company of Ireland, after an unprofitable outlay. But how different are the facts; the letter of Mr. Adam Murray, which appeared in our columns of the 23rd April, will best speak for itself, and should alone have been sufficient to have opened the eyes of the infatuated shareholders, who now find, too dearly to their cost, that the delay which has occurred has been only adding to the losses they had previously sustained. For the information of those who may not have seen a copy of this document, we are induced here to insert it.

"Sir,—In your paper of the 16th instant, I observe you class my name with Richard Griffiths, R. Frazer, J. Bakewell, and W. H. Potter, in your report of the "*West Cork Mining Company*." What these other gentlemen recommended to be given for the Audley Mines, I know not; but I can assure you that I never recommended any such sum to be paid as 165,000*l.* for these mines. Three years ago, when I was employed by Lord Audley *to value all his estates in the county of Cork, surface, slate quarries, copper mines, &c., my estimate of the whole property was about* 90,000*l. for the whole, fee, &c., including mines. I think I valued the minerals at* 20,000*l.: no greater price should have been given for them.* I took great pains in estimating the property correctly.

"I am, Sir, your most obedient servant,

"*Swansea, April* 17, 1836." "Adam Murray."

Having thus put our readers in possession of the principal points of the prospectus, we shall now take the accounts presented at the half-yearly meetings; and, first, that purporting to be the

WEST CORK MINING COMPANY'S BALANCE-SHEET, 31ST DEC., 1834.

Dr.	£	s.	d.
To Cash paid on account of purchase money	7,699	0	11
,, Expenses of London establishment at Salvador-house, and at the wharf at Rotherhithe	1,872	11	5
,, Furniture, fixtures, &c., at Salvador-house, and at the wharf at Rotherhithe	346	5	3
,, Parliamentary expenses	351	0	0
,, Freight of produce	551	17	4
,, Cost of machinery and erecting sheds at the wharf at Rotherhithe	737	11	1
,, Furniture, fixtures, &c. in Ireland	140	0	10
,, Cost of gunpowder in store	175	18	6
,, Cappagh works, buildings, implements, &c.	1,640	3	2
,, Castletownsend works, buildings, implements, &c.	321	13	6
,, John Davies, provincial director, on account of shares	755	0	0
,, Advances to agents	822	14	2
,, Balance in bankers' hands	4,459	0	11
,, Exchequer Bills	1,558	16	0
,, Bills receivable	4,709	12	11
	£26,130	0	0

Cr.	£	s.	d.
By deposits upon shares	26,130	0	0
	£26,130	0	0

The above account has been examined and audited by us,
Salvador-house, Bishopsgate-street, London, 28th Feb., 1835. J. Clark, Thomas Pike, } Auditors.
Presented at the general meeting, held this 5th day of March, 1835.
Joseph Pike, Chairman.

Up to this period it then appears, that the proprietors had subscribed 26,130*l.*; the expenses of the London establishment, one of the first items, being 1872*l.* 11s. 5d.; and that the freight of produce amounted to 551*l.* 17s. 4d., which, it is to be presumed, represented some value in stock. It is not our intention to notice the other items, but shall at once proceed to the account made up to 30th June, 1835, which is as follows:—

WEST CORK MINING COMPANY'S BALANCE-SHEET, 30TH JUNE, 1835.

Dr.	£	s.	d.
To cash paid on account of the purchase-money	26,349	4	8
Expenses of London establishment at Salvador-house, and at the wharf at Rotherhithe, and salaries of officers at the works in Ireland, and of agents in England	6,587	4	9
To furniture, fixtures, &c. at Salvador-house, and at the wharf at Rotherhithe	475	10	1
,, Parliamentary expenses	368	0	11
,, Freight of produce	1,135	8	3
,, Cost of machinery, and erecting sheds at the wharf at Rotherhithe	1,979	2	6
,, Furniture, fixtures, &c. in Ireland	392	16	5
,, Cost of gunpowder in store	139	9	7
,, Cappagh works, buildings, implements, &c.	4,276	9	5
,, Castlehaven works, buildings, implements, &c.	1,318	7	5
,, John Davis, provincial director, on account of shares	799	6	7
,, Advances to agents	496	9	10
,, Balance in bankers' hands	9,366	9	4
,, Exchequer Bills	1,558	16	0
,, £5442 3 6 Consols	5,000	0	0
,, Cash and bills	1,878	8	5
	£63,017	3	6

Cr.	£	s.	d.
By cash received on account of shares	61,465	0	0
,, Ditto on account of produce sold £1,990 17 0			
,, Ditto to first dividend from produce, by resolution of the general court, held on the 5th March, 1835 ..... 825 0 0			
	375	17	0
,, Unclaimed dividend	140	0	0
,, Interest on Exchequer Bills	36	6	6
	£62,017	3	6

Debts due to the company for produce sold.. £700
Produce on hand estimated at 16,000
The above account has been examined and audited by us,
Salvador-house, Bishopsgate-street, London, July 24, 1835. J. Clark, Thos. Pike, } Auditors.
Presented at the general meeting held this 31st day of July, 1835.
Joseph Pike, Chairman.

It will be here observed, that in addition to the instalments on shares, which at this time amounted to 61,465*l.*, some produce had been sold, the gross amount of which (*not the profits arising from the sale*, be it observed) was 1200*l.* 17s. This sum "by resolution of the general court, held on the 5th of March, 1835," was appropriated to the payment of dividends, amounting to 825*l.*, or 5*s.* per share, although the Act expressly provides that dividends shall be declared only out of actual *profits*, and not out of *produce*. The whole of the ores sold up to this time appears to have been 1900*l.* 17s. (including 700*l.* not received), while the freight alone amounted to 1135*l.* 8s. 3d., and the expense of management for the *half year* to 4714*l.* 12s. 7d.; and this, it must be remembered, exclusive of the outlay on the works, and expenses for furniture, fixtures, &c., which we find at that time to have amounted to 8353*l.* 12s. 9d.; making in all for these items, 14,203*l.* 13s. 7d. So that the dividend then declared was illegal, and a deception practised on the shareholders, it being clear that no profit could possibly have arisen from the sale of produce, after allowing for the expenses incurred.

It may be said, however, that the produce on hand was estimated at 16,000*l.*—for the statement was examined and audited by Messrs. J. Clark and Thomas Pike, the auditors, and signed by the managing-director, as chairman of the meeting at which it was presented; but as twelve months and more have now elapsed, and no returns, that we have heard of, from this estimated produce, we must conclude it was not in existence. We will now take the third half-yearly balance-sheet, made up to 31st December, 1835, of which the following is a copy:—

WEST CORK MINING COMPANY'S BALANCE-SHEET, 31ST DEC. 1835.

Dr.	£	s.	d.
To cash paid on account of purchase-money	36,569	9	1
,, Expenses of London establishment at Salvador-house, and at the wharf at Rotherhithe, and salaries of officers at the works in Ireland, and of agents in England	10,126	16	6
,, Furniture, fixtures, &c. at Salvador-house, and at the wharf at Rotherhithe	514	17	7
,, Parliamentary expenses	368	0	11
,, Freight of produce	1,135	8	3
,, Cost of machinery, and erecting sheds at the wharf at Rotherhithe	3,054	10	5
,, Furniture, fixtures, &c. in Ireland	656	0	11
,, Ditto ditto at Liverpool	41	17	5
,, Cappagh works, buildings, implements, &c.	9,563	12	10
,, Castlehaven ditto, ditto ditto	1,766	12	9
,, Advances to agents	1,078	3	6
,, Cost of two ships, the *Emily* and the *Traveller*, and their stores	995	17	9
,, Balance in bankers' hands	4,242	5	7
,, Exchequer Bills	5,137	16	10
,, £5442 3 6 Consols	5,000	0	0
,, Cash and bills	1,732	13	3
	£81,966	15	3

Cr.	£	s.	d.
By Cash received on account of shares	75,869	0	0
,, On account of produce sold ... £1,209 17 0			
,, To first dividend from produce by resolution of the General Court, held on 5th March, 1835 ..... 825 0 0			
	375	17	0
,, On account of produce sold	517	19	11
,, Unclaimed dividend	110	0	0
,, Interest on Exchequer Bills	23	5	3
,, Half-year's dividend on 5442*l.* 3s. 6d. Consols	91	12	7
,, Loan on Exchequer Bills	5,000	0	0
	£81,969	15	3

Debts due to the company for produce sold, £2,086
Produce on hand, estimated at 16,000
The above account has been examined and audited by us,
J. Clark, Thomas Pike, } Auditors.
Presented to the general meeting held this 3d day of March, 1836.
Thomas Pike, Chairman.
Salvador-house, Bishopsgate, London.

From this we collect that the produce sold up to this period, including debts, amounted to 3804*l.* 16s. 11d., the freight on which

was 1135*l.* 8s. 3d., leaving 2660*l.* 8s. 8d. as the net produce of the sale; against which is, however, to be taken the cost of quarrying the slates, or the extraction of the ores, including buildings and machinery, which appears to have then amounted to no less a sum than 14,374*l.* 16s.: to this is also to be added, expenses of London establishment for the eighteen months, with furniture and fixtures, including the salaries of officers at the works in Ireland, being at the rate of about 7500*l.* a year, or 11,341*l.* 12s. 5d.,—in all, 25,716*l.* 8s. 5d.; and this exclusive of other items in the account: yet the directors were able, with sales amounting to 3804*l.* 16s. 11d., more than one half of which had not been received, not only to discharge the cost of freight (although two ships belonged to the company), being nearly one-third the whole value of the produce sold; but the enormous sum of 25,716*l.* 8s. 5d., which it had cost in raising and bringing the produce to market; and further, to be enabled to declare a dividend out of the *profits*.

This account is the last which has been presented to the proprietors; but having been favoured with the sight of a balance-sheet, furnished from the office of the company, we think it right to submit the same for the information of the shareholders, merely premising, that it not being duly "examined and audited," and signed by the chairman, it must not be considered an official document, although possibly entitled to equal credit:—

ABSTRACT OF THE LEDGER OF THE WEST CORK MINING COMPANY, 30TH JUNE, 1836.

Dr.	£	s.	d.
Willis and Co.	928	4	7
Vere and Co.	445	15	3
Lord Audley	54,007	7	1
Furniture, fixtures, &c. at Salvador-house	518	14	0
Expenses in trade	8,530	13	8
Act of Parliament	368	0	11
Captain Robert Forster	15	3	2
John Davis	26	3	8
Furniture, fixtures, &c. in Ireland	808	0	11
Thomas Finlason	20	0	0
Manganeses account	1,135	8	3
Fixtures, &c. at Rotherhithe wharf	4,558	16	7
John Davis (share account)	500	0	0
Cappagh works	14,281	11	9
Buildings, implements, &c. at Cappagh	1,076	19	3
Castletownsend works	2,208	0	2
Buildings, implements, &c. at Castletownsend	81	12	9
Consol account	5,000	0	0
Directors and auditors' pay	1,875	0	0
Expenses for the manufacture of euchrome colour	1,195	12	7
William Austin	212	4	2
Disbursements, &c. ship *Emily*	248	10	9
Ship *Emily*	566	5	6
Matthew Thompson	38	0	0
Furniture, fixtures, &c. at Liverpool	41	17	5
Ship *Traveller*	544	5	0
John Sparke	53	16	11
Filemuck works	1,166	18	0
Varnish account	282	11	2
Ship *Lord Amherst*	337	14	3
Ship *Hope*	807	8	1
Underwriters' account	89	1	4
Disbursements, &c. ship *Lord Amherst*	101	15	1
Ditto, ship *Hope*	50	1	4
John Harrison	19	1	0
Balance	2,569	1	3
	£104,709	15	10

Cr.			
Share account, first instalment	32,910	0	0
Ditto, second ditto	21,590	0	0
Euchrome account	481	19	1
Slate account	423	16	7
Dividend account	430	15	0
Interest account	163	5	2
Share accoun , third instalment	19,950	0	0
Ditto, fourth ditto	19,530	0	0
Ditto, fifth ditto	9,230	0	0
	£104,709	15	10
By balance (cash bills, &c. &c.)	£2,569	1	3

This brings the account up to 30th June, 1836, and it will be well here to compare the abstract of the ledger with the balance-sheet presented at the meetings previously held.

In the former we find the receipts on shares to amount to 103,630*l.* The produce of sales of slate and colour, 905*l.* 14s. 8d.; to the credit of the dividend account, 430*l.* 15s.; and interest, 163*l.* 5s. 2d.: making a total of 104,709*l.* 15s. 10d. Of this amount, 54,007*l.* 7s. 1d. is stated to have been paid Lord Audley, leaving a like sum remaining to be paid his lordship, to make up 110,000*l.* cash, in addition to the 1100 shares, given to him as an equivalent to 55,000*l.*; making up the *purchase*-money of 165,000*l.* Expenses in *trade*, a *new* account is debited with 8530*l.* 13s. 8d., which, if we mistake not, includes the managing director's salary, and some other items which are found to be conveniently placed under this head. We, however, lose the item of expenses of London establishment, &c., which, in the preceding account is placed at 10,126*l.* 16s. 6d., in lieu of which, the pay of directors and auditors is given at 1875*l.* The produce of the sale of ores does *not* appear in the account, and the dividends paid, are in like manner passed by unnoticed, for which we presume there are cogent reasons. The Manganese account, which article, by-the-bye, it was stated in the prospectus, could be raised at 3s. 6d. per ton, and sold at from 7*l.* to 10*l.* per ton, has 1135*l.* 8s. 3d. to its debit; and the expenditure at the Cappagh works had then increased to 14,281*l.* 11s 9d. But so complex are the accounts, so utterly at variance with the half-yearly statements previously furnished, that we fear any attempt on our part at explanation, would tend only to involve them in greater mystery.

Without making any further comment therefore on the accounts themselves, we shall now turn to the Act of Parliament for governing the affairs of the company, and see how far the directors have acted up to the duties imposed on them, and the legality of their acts, whether with respect to the dividends they have declared, to the salaries they have appropriated to themselves, or to the disposal of the guarantee-fund of 5000*l.*, not to remark on the absence of the last half-yearly statements which they were bound to furnish and cause to be printed. Ere leaving the subject of the accounts, we cannot however but make one other remark on the "produce on hand, estimated at 16,000*l.*" which is duly carried forward in the account made up to 31st December. The proprietors have a right to inquire whether this 16,000*l.* be merely ideal or otherwise; for we fear, although the item has been examined and audited, it will be found not to be represented in actual produce.

From the foregoing accounts, it will be evident that the dividends declared must have been abstracted from the capital, and could not have arisen from the profits of the undertaking. Let us, however, to the proof—with a sale amounting only to 3804*l.* 16s. 11d., and with an expenditure of twelve times that amount, or 48,133*l.* 7s. 6d., exclusive of payments made on account of the purchase-money of 54,007*l.* 7s. 1d., the fair declaration of a dividend was out of the question. To contemplate such an artifice escaping detection, appears to us so absurd, that we can only imagine the directors to have possessed an extraordinary degree of assurance, or the proprietors to have been utterly regardless of their property and the principles of those to whose charge they had confided its management.

We will, however, proceed to consider the Act, in which the clause runs thus—

"Provided also, that no dividend shall be made, whereby the actual capital for the time being shall be impaired or in any degree reduced; and that the Chairman and Directors who shall concur in making such dividend, shall be personally responsible to the proprietors, and also the creditors of the said Company, for any injury that may arise therefrom."

We will ask any shareholder, whether the words of this clause are not sufficiently clear to render the directors who made such dividends "personally responsible"—we contend that they are.

The next extract we shall make from the Act of Parliament is, that, having reference to the accounts of the company, which it will be observed, after having been audited and approved, become binding on the proprietors, "unless some manifest error or errors," amounting to fifty pounds and upwards, shall be detected within eight months from the date of such approval. By this clause the directors are bound to have the *books* balanced half-yearly; to be duly examined and audited by the auditors, and approved by the directors, and an abstract submitted at the half-yearly meetings of the company. Whether this has been done, and if so, whether done properly or otherwise, is for the proprietors to inquire.

"And be it further enacted, that the said directors shall cause the books of the said company to be balanced up to the 31st day of December, 1834, and up to the 30th day of June, and 31st day of December, in each succeeding year, or to such other period or periods of each year as any general meeting shall from time to time appoint; and the said books being so balanced, shall, from time to time, be examined and signed by the auditor, and approved by the said directors; and an abstract of the said balance, showing the state of the receipts and disbursements, and the debts and credits, funds and property of the said company, shall, from time to time, be signed by the said auditors, and shall be respectively produced at the general meeting of the said company, to be held upon the first Wednesday in the months of February and July in every year, or within thirty days thereafter; so that any of the proprietors attending the meetings may have an opportunity of inspecting the same, and shall be forthwith afterwards printed and circulated amongst the proprietors; and every such abstract, after the same, with any alterations or corrections which may have been made at any meeting of the company, shall have been approved of, either at the general meeting of the company at which it is to be produced, or at any subsequent general meeting, shall be signed by the chairman of such meeting, in testimony of such approval; and thereupon and thenceforth the same shall be binding and conclusive on all the proprietors, of the company and their respective executors, administrators, successors, and assigns, unless some manifest error or errors, to the amount, in the whole, or fifty pounds or upwards, be discovered therein by any one or more of the proprietors of the company, within eight calendar months after such approval: in which case, such error or errors, and only such error or errors, shall be rectified by the committee of directors without delay; and the abstract so corrected, shall be produced at the first half-yearly general meeting which shall be thereafter held; and thereupon the said abstract shall be, in all respects, binding and conclusive on all the proprietors, and their respective executors, administrators, successors, and assigns.

We will now take a cursory view of the Act referring to such clauses as appear to us of importance to be considered at this moment:—

CLAUSE 3.—Provides, that any proceedings at law or in equity, may be carried on either on the part of the company as plaintiffs, or against them as defendants, in the name of the managing director, or any one director for the time being, as the nominal plaintiff or defendant in the proceedings so instituted.

CLAUSE 4.—Gives power to the Board of Directors, or any three, upon giving seven days' notice of such intention to purchase mines; and, "also to sell, dispose of, or absolutely alienate any such mine, &c. which they may have purchased." This, it will be observed, is placing much power in the hands of the directors, who might virtually by their acts annihilate the company without consulting or taking the opinion of the proprietors on the subject. As we read it however, we think it refers only to those mines, "which they may have purchased;" and in this case, as the Audley estates were comprehended in the formation of the company, and antecedent to the framing of the Act, this clause can be only said to apply to such mines as they might subsequently acquire.

CLAUSE 16.—States, that every lease shall express it is not for the individual benefit or advantage of the parties thereto, acting on behalf of the shareholders as trustees—now that the execution of a lease, (if lease there be of the Audley mines,) was for the individual benefit and advantage of the parties thereto, is we believe pretty clear, if we confine ourselves to the bonus of fifteen shares, with fifty pounds per share paid thereon, which each director accepted from the lessor on the formation of the company.

CLAUSE 17.—Recites, that should additional capital be found necessary, the same shall be subscribed in shares of 50*l.* each, in like manner as the original capital. Here we would remark, that in defiance of this provision, and the term on which additional capital is to be raised, the directors issued a circular, whereby the 50*l.* per share on the 1100 additional shares, was to be paid by instalments, the last falling due in the year 1840; while they state to the proprietors, as an inducement for them to subscribe for the new shares, that they "are advised by counsel that the dividends must be paid upon each share *rateably*, and not upon the amount of the deposit:" thus holding out, that on the 15*l.* per share then required, the same dividend would be paid as that to which the share on which 50*l.* had been paid would be entitled. Not to remark on the absurdity of an Act of Parliament being so worded as to bear a construction of this kind (although the managing-director assured us personally the company had got "such an Act" as was never again likely to pass the Legislature), we will take the words of other clauses which have reference to this question.

At p. 13.—The Act states, that the capital of the company shall be vested in the subscribers, in proportion to the sums they shall have "severally subscribed and contributed thereunto." The next clause (17), that to which we have already referred, points out that the *additional* capital is "to be raised by subscription, in shares of 50*l.* each, in the like manner as the said original capital;" while the clause prescribing the manner in which the dividends shall be paid, distinctly states that the "dividend shall be declared amongst the proprietors out of the clear residue;" and further, "that such dividend shall be according to the shares they may severally hold, and the sums of money severally paid by them." These are the words of the Act of Parliament, and to attempt to raise additional capital by any other means, is to rival only the act of declaring dividends out of the *capital* instead of the *profits*. Those proprietors who have so advanced their money, we think have a fair right of action to recover the amounts paid on so deceptive a proposal.

CLAUSE 19.—Provides for the sum of 5000*l.*, being invested as a guarantee-fund, and which shall not be sold out until the fund to answer contingencies shall amount to 10,000*l.* It, however, provides also for its application by the directors to the payment of any debt; requiring, however, so often as the amount may be diminished, that the sum shall be forthwith reinvested. How far the directors may have been justified in withdrawing this fund, we leave to the proprietors to inquire.

CLAUSE 30.—Provides, that every director shall be a "*bona fide* holder, and possess in his own right, and shall continue so to hold and possess, fifteen shares at least of the joint stock of the said company, any proprietor holding less than such number being disqualified from the office of director." We believe the board of directors, or a large majority of them, are not prepared to prove that they are *bona fide* shareholders. What, we would ask, was the consideration given for the fifteen shares of which each became possessed, as a qualification, by transfer from Lord Audley? If the consideration was their good services to promote that nobleman's interests, how will the clause (46) bear upon this, which provides, that no director shall vote on any question in which he may be interested? and that the directors would be indirectly interested in all questions touching payment of monies, &c. to Lord Audley, we should think admits not of a doubt.

CLAUSE 37.—Is one of importance at the present moment, as it provides for the removal of the chairman and directors, for negligence or misconduct. We therefore give it at length:—"Provided always, and be it further enacted, that it shall and may be lawful for any general meeting of the proprietors of the said company, specially called for the purpose, to remove from his office any director, including the chairman of the directors, or auditor, for negligence or misconduct in office, or other reasonable cause."

We believe it is easy of proof that there has been "negligence or misconduct in office, or other reasonable cause," which would fully justify the removal of the directors; and with that object, the meeting to be held this day was called. That it has not been convened in close adherence to the words of the Act, which provides for its being duly advertised in the *London and Dublin Gazette*, twice at least, and fourteen days' notice to be given, is, we imagine, one of the technical objections raised, as to the validity of the acts of the meeting. But how are we to treat the opinion of the Attorney-General, who declares as follows:—

"I am of opinion that there is no power to call a special general meeting except by the directors, in the manner specified in pp. 29, 30, of the Act; and therefore that the meeting called without their authority for the 19th inst. is illegal.

"*Nov.* 14, 1836." "J. CAMPBELL, Temple."

This opinion may require a little explanation, and here we are bound to admit, that the managing-director was right when he stated to us, "such an Act of Parliament never had, nor ever would again, pass the Legislature." The clause we have just cited, declared that the directors may be removed from office at a general meeting of the proprietors, specially called for the purpose: but the said directors have very cleverly managed that the usual clause should be omitted, which provides for the manner in which special general meetings are to be called by the proprietors, on a requisition signed by a certain number holding —— shares in the aggregate, such requisition being left at the office of the company; and in case the directors shall not in —— number of days convene the meeting, on the requisition so signed, then, that the requisitionists shall have the power to hold the same. This clause, as we have observed, is omitted in the Act; and hence the opinion of the learned Attorney-General, who says, no special general meeting can be called, except by the directors, and we have not the slightest doubt of the correctness of such opinion.

It will be seen by reference to Clause 32, that the chairman is elected, and may continue in, and hold the said office until Feb. 1838, as also the six other directors, two of whom retire in that year; so that, without some course be adopted, whereby the company can rid themselves of the directors, other than appears by the Act of Parliament, we fear they are placed in an awkward position,—they may complain, but they cannot help themselves. If, however, our position be correct, as regards Clause 30, which declares that each director shall be the *bona fide* holder of fifteen shares at least, or that he shall otherwise be disqualified from holding office, we think there can be no difficulty in declaring the offices vacant, not to advert to the question of liability on the part of those who have assumed the offices of directors without being duly qualified, as provided for by the Act.

CLAUSE 43.—Gives very full power to the directors, whereby they are enabled "to direct, manage, and transact the affairs and business of the said company;" but all such powers it will be found are "subject to such orders, by-laws, rules and regulations as shall at any time be duly made by the said company in restraint, control, or regulation of the powers and authorities by this Act granted." By reference to Clause 48, it appears that the proprietors assembled at a general meeting (we are now contemplating the next half-yearly meeting to be held the first Wednesday in February, 1837, or within thirty days after) have power "to regulate, control, and make provision for the management and carrying on the affairs of the said company, and to transact any business relative thereto," from which we conclude that there is a power vested in the proprietors, which may be usefully employed.

CLAUSE 45.—We have already remarked upon as touching half-yearly accounts.

CLAUSE 46.—Regulates the proceedings of directors, in which it is provided, "that if any question shall be discussed in which any director shall be interested in any other manner than as a director, in common with the other directors, such director shall not be entitled to vote upon that question." On this point, we have already offered an opinion, on which we think at least a court of equity will entertain one of a similar tendency.

CLAUSE 51.—Enacts, "That all and every contract, or contracts, made or entered into by or on behalf of any chairman of the directors, director, or auditor of the said company, or in which any such chairman, director, or auditor, shall be either directly or indirectly interested or concerned, &c. shall be absolutely null and void to all intents and purposes whatsoever; and every chairman, director, or auditor, who shall enter into, or be knowingly concerned in any such contract or contracts as aforesaid, shall *ipso facto* cease to be such chairman, &c. as the case may be." This clause, we are aware, more particularly refers to contracts for "works for or on behalf of the company," but we doubt whether it may not be applied to the case immediately under the consideration of the proprietors at the present moment.

CLAUSE 53.—Provides for one-tenth part of all monies arising from the profits of the undertaking being set apart and reserved. We presume the directors, fully sensible that no profits have been made, have deemed it unnecessary to note this clause.

CLAUSE 54.—This clause directs the payment of dividends, the provisions of which are so clearly defined that they hardly require comment. Having already noticed the clause, it may be sufficient here to observe that a dividend can only be declared out of the clear residue; such dividend to be only paid according to the sums of money severally paid on the shares, and provided that no dividend shall be declared whereby the actual capital for the time being shall be impaired or reduced. The chairman and directors concurring in making dividends improperly being personally responsible.

CLAUSE 55.—Provides that the directors shall have full power and authority to reimburse themselves "for all loss, damage, costs, charges, and expenses which they or any of them shall bear, sustain, or be put to by reason of any matter or thing to arise or happen in the execution of this Act, out of all or any of the funds or property of the said company." What may be the meaning of the words in the execution of this Act, we do not profess to be able to define, but we should imagine it refers to carrying the Act into execution, and does not contemplate its violation.

We must now leave the Act, and with a few observations close our notice for the present of the proceedings of a company unparallelled, we do not hesitate to say, in all the schemes of 1824 and 1825. We envy not the projectors the notoriety which is likely to attend them.

Having by means of the prospectuses of the company, copies of the accounts, and extracts from the Act of Parliament, put the proprietors in possession of some useful information with regard to the affairs of the company, to which we have appended such remarks or comments as appeared to be called for, we shall conclude by observing, that a serious question arises, whether the company even possess a legal title to the property. So long since as April last, we used the following words:—

"It will be recollected by many of our readers, that the mines now possessed by this company were formerly worked and *abandoned* by the 'Mining Company of Ireland,' who advanced (we believe in 1825) 10,000*l.* to Lord AUDLEY on mortgage; and which he was bound to repay to that Company, with interest, on the surrender of the lease of the mines. Not having, up to the present time, fulfilled this condition, whether he could legally convey, or make out, a title to the mines, or any part thereof, the legal estate being vested with the trustees of the Mining Company of Ireland, we are not prepared to say; but we do most unhesitatingly state the fact, and that on the best authority, that not only were the Directors of the West Cork Mining Company duly apprised of this circumstance, but also of the fact, that 'proceedings had been instituted in the Irish Court of Chancery to effect the *sale* of the estate, for *payment of debts* to a very large amount charged upon it.'"

Late information confirms the view we then took, and we think the following extract from the letter of a correspondent in Ireland, on whose statements we can place every reliance, will induce the shareholders to investigate this matter more closely, ere they embark further capital, no matter who are the directors. The following is the extract referred to:—

"Perceiving by the Journal received to-day, that you have been threatened by the West Cork 'Direction,' and are desirous to receive suggestions on the subject, I think it right to remind you that Lord

Audley's property in the county of Cork, alleged to have been purchased by the 'Direction,' is now the subject of some eight or ten suits in the Court of Chancery here. First, the suit of the Mining Company of Ireland, as mortgagees, for sale of the estate for payment of 10,000*l.*, due on foot of their mortgage; and next, on the part of [illegible] puisne judgment creditors, for a similar purpose. That the legal estate is vested in the trustee of the Mining Company, as holding the first mortgage; and therefore, that Lord Audley could not have given to the West Cork Directors a legal title even to work the mines, much less execute a *bona fide* bill of sale as alleged. It is also a fallacy to allege that the sum of 165,000*l.*,* or even *ten* thousand pounds has been expended in working the mine and quarry; for, with the exception of three *houses*, built for the accommodation of *directors* and *agents*, and a few hundred pounds unprofitably expended in searching, no part of the large sum mentioned has reached 'West Cork.' How, then, has it been disposed of? is a fair question for the shareholders; who may also be informed, that if ores of any value shall be discovered on the property, an immediate application will be made to the Chancellor here on behalf of the creditors of Lord Audley, to bring the produce into court for payment of the debts: a prayer which would be granted as a matter of course under the circumstances stated.

"I have merely to add, that prior to the alleged purchase by the 'West Cork' from Lord Audley, the estate stood charged in our courts with debts exceeding its full value; and that those debts must be paid before the 'West Cork' can derive any interest, in either lands or mines, from Lord Audley's alleged sale to them."

* Our correspondent is here in error, the amount is about 25,000*l.*, exclusive of salaries.

PROCEEDINGS OF SCIENTIFIC MEETINGS.

GEOLOGICAL SOCIETY.—Wednesday, Nov. 16.

Mr. Lyell, President, in the chair.

The following papers were read:—

I.—On Indications of Change in the Relative Level of Land and Water in the Estuary of the Clyde, by Mr. Smith, of Jordan Hill, F.R.S. and G.S.

In the West of Scotland are two superficial deposits. The lowest, locally called "till," consists of unstratified clay confusedly mixed with boulders, and rarely contains organic remains; but stags' horns, tusks and bones of the elephant, sometimes associated with marine shells, have been found.

The upper deposit is composed of finely laminated clay, overlaid by sand and gravel: and marine remains of existing species occur in every part of it, but most abundantly in the clay.

This stratum Mr. Smith has traced on both sides of the Clyde, from Glasgow to Roseneath and Greenock, at points varying from thirty to forty feet above the level of the sea; and he gives detailed accounts of its characters and organic contents at the following localities:—A brick-yard in Glasgow, thirty feet above high-water mark, where he procured remains of six species of living marine shells; the canal from Glasgow to Paisley and Johnstown, in excavating which twenty-six species of existing marine testacea were found imbedded in the clay; the brick and tile yards around Paisley, and in the adjoining parishes; a farm and a hill near Renfrew, which are called Cockle Farm and Cockle Hill, in consequence of the great abundance of cockles; Johnstown, eight miles from the sea, where, in making a well, the bones of sea-fowls and fishes, crabs' claws, seaweeds, and numerous recent shells were found; Helensburgh, Loch Lomond, on the shores of which oyster shells occur at the height of seventy feet; Dalmuir, and the banks of the Firth of Forth.

With respect to the origin of these superficial deposits, Mr. Smith is of opinion, that the lower, or "till," was accumulated by the violent though transitory action of a body of water; but that the upper was gradually deposited at the bottom of a sea of sufficient depth to protect the sediment from the agitation of waves; and he conceives that the change of level was effected gradually, in a manner analogous to that now taking place on the coast of Sweden, and described by Mr. Lyell in a memoir recently published in the Transactions of the Royal Society.

Of the period at which the change occurred the author offers no conjecture, but that it was anterior to the occupation of Britain by the Romans is evident, as the terminations of their wall on the shores of the Forth and the Clyde, were constructed with reference to the present level of the sea; and it is worthy of remark, that no human remains or works of art have been discovered in the deposits.

The important question, whether the Fauna and Flora of the period when the clay-bed was deposited were identical with those of the present epoch, Mr. Smith says it would be premature now to determine. A very great proportion of the species of shells, about seventy in number, abound in the adjacent seas, but a few appear to have become rare, if not extinct with reference to the coast of Scotland.

The author concluded by observing, that as these deposits belong to the newer pliocene, or most recent formations, every circumstance connected with them ought to be carefully observed and recorded, in order that our researches into the more ancient portions of the earth's crust may be conducted on a sure basis, and with proportionate success.

II. A Paper, by Mr. W. C. Williamson, Curator of the Manchester Natural History Society, on the Distribution of Organic Remains in the Oolitic Formations on the Coast of Yorkshire.

The principal object of this communication is to give observers in other parts of the kingdom a measure of comparison, by which they may determine the extent of change in the organic remains of the oolitic formations, either with respect to the horizontal range of a bed, or the recurrence of species in different members of the oolitic series. The formations were described in ascending order, and for the inferior oolite, the chief locality mentioned was Blue Wick; and for the lower, sandstone and shale, the cliffs between Cloughton Wyke and Blue Wick; and for the great, or Bath oolite, the principal localities were Cloughton, White Slab, and Cayton and Gristhorpe Bays.

It is impossible to give, in a brief notice, an analysis of the paper, as the details had reference chiefly to the enumeration of species, and the relative abundance of each fossil in different beds.

REDRUTH LITERARY INSTITUTION.

At a very fully attended meeting of the members of this institution, on the 1st instant, Mr. Robert Vere Fox delivered the following interesting lecture "On the Formation of Mineral Veins:"—

"In a letter to Sir Charles Lemon on the subject of mineral veins, which was read before the Geological Society last spring, I endeavoured to show, that the existence of metalliferous veins in certain directions, and their intersection by others at right angles to them, which are non-metalliferous, is not inconsistent with their contemporaneous origin as fissures. Hitherto, I believe, similar opinions have not been held by geologists, not because it did not seem reasonable to suppose, that whatever cause produced fissures in one direction, would also produce them in an opposite one, or nearly so; but then it did not appear how the very different phenomena presented by mineral veins, even when traversing the same rock, could be reconciled with the co-existence of the original fissures in contrary directions.

"I have on some other occasions given an outline of my views on this subject, but finding that a more full explanation of them would be acceptable to some of my friends, I feel desirous to state it in the presence of practical and experienced miners, hoping that they will kindly furnish me with any facts connected with the geology of our mines, which have come under their notice, or may do so hereafter. Their information may be favourable or unfavourable to the theory which I have ventured to put forth; be this as it may, I am desirous to have all the points fully investigated, in order to arrive at the truth; and the sooner we do so the better. Difficulties and apparent anomalies, we must, of course, be prepared for in the course of such investigations; many I have already met with, which have disappeared on a closer examination, and not a few of the phenomena of mineral veins, which at first seemed to be opposed to the theory, were ultimately found to be rather confirmatory of it. I confess I am sanguine that this will still be the case, but if it should not be so, the attempt to solve this difficult problem, and to establish something like general principles, will, in all probability, stimulate the inquiries of practical men, and elicit facts which may prove not only interesting to geologists, but useful in the prosecution of mining operations.

"I have always objected to the theories which have from time to time come under my notice, and which were intended to account for the formation of mineral veins. I would not admit the idea that large fissures, such as the veins are supposed to represent, could have existed in the earth till they became filled up with their present mineral contents. The width of the veins, and their very near approximation and frequent intersections, seem to render this hypothesis highly improbable; nor could I imagine that the fissures now constituting tin veins might have been formed at one epoch, and copper veins quite contiguous and parallel to them at another, whilst the fissures from which cross-courses originated, occurred at a still later period, to say nothing of the different relative ages of copper veins themselves, assumed from their mutual intersections. In these speculations the lines of least resistance were overlooked, and mechanical laws were in many ways, as it appeared to me, disregarded.

"I have now no hesitation in saying, that my objection to the existence of such large open fissures is decided as ever it was; but I think it will be seen that the same objection does not apply to fissures, very small at first, and kept open by innumerable surfaces and points of contact between the irregular walls of the fissures themselves, or by the small fragments of rock, which may have fallen in at the moment when the openings occurred, and these openings progressively enlarged, either gradually, or at intervals, whilst the process of filling them up was simultaneously going forward. This view of the subject was first suggested to me by noticing that *mud*, when drying, exhibited cracks having a tendency towards a rectangular position with respect to each other, and that they all became gradually enlarged. Not that I compared the surface of the globe to mud in the act of drying, but the same effect, it appeared to me, would be produced by a change of temperature in the crust of the earth, or by any subterranean force which might tend to change the level of the surface.

"There is ample evidence in all parts of the world of elevations and depression having occurred, and which, in many places, are still going on. In Scandinavia, for instance, the land gradually rises about four feet in a century. In Chili a large district has, within a recent period, been suddenly, and so far, permanently raised. In Greenland, on the contrary, great extent of land has been gradually submerged, and in some places the remains of buildings may be seen covered by the sea.

"Whatever causes may have operated to produce and enlarge the fissures, whether elevation, in consequence of augmented subterranean temperature, or other forces acting gradually, or at intervals, or contraction, caused by a diminution of temperature at the surface, it is probable that such fissures would be in different directions, and open nearly at right angles to each other. Their directions would, in all probability, be materially influenced by the structure, perhaps by the joints of the rocks; and however gradually the force which produced them might have tended to open them further in opposite directions, it is to be supposed that most of the fissures yielded at intervals, or by fits and starts, and not in a very gradual and uniform manner, for, it may be observed, that when bodies are subjected to a sufficient degree of tension, a crack is suddenly formed; or, if already formed, it is often suddenly and considerably increased.

"In proportion as such fissures became enlarged, whether they were produced by elevation or contraction, there would be a greater or less tendency to dislocation. It is very possible, however, that there may have been an alteration of these causes, and that fissures resulting from elevation may have become filled with matter, and thus been in a degree wedged up, so as not to yield or sink gradually when a depressing cause may have succeeded. Hence may have arisen disruptions or dislocations of the strata, producing *shifts* or "*heaves*," such as are found in our mines. The hypothesis of the progressive opening and filling up of fissures certainly obviates many objections to which that of large open fissures is liable. A small fissure might easily have its hanging wall supported by the matter which would fall into it, and when in time it became filled, the second enlargement might be sustained like the first. Most lodes, as well as cross-courses, I believe, afford in some part or other evidences of this progressive cracking. It is generally most decided near the surface, or at the back of lodes; and I have specimens from a shallow mine near Falmouth, which give clear evidence of this process; for the walls of the included small veins are just as perfect and well-defined as the outermost walls of the lode, which are common to them all. At great depths many causes may have operated to obliterate, more or less, the proofs of progressive opening, but yet these indications commonly exist in our mines, and the veins are then called by the miners '*comby*' lodes.

"Fournet, a French geologist, I find, has noticed indications of progressive opening of fissures in France. I was not aware of this fact till some time after my paper was read before the Geological Society, but the observations of this geologist tend to generalise the fact, and to corroborate the arguments derived from our own minds in favour of this opinion.

"The hypothesis of a small progressive widening of the fissures seems to explain why the more mechanical contents of the veins are characteristic of the rocks which they traverse, whereas, if the fissures had attained their full dimensions at once, fragments of the upper rocks would surely be found in greater or less abundance, and at considerable depths, in those parts of the veins which are situated in other deeper rocks.

"Such fissures filled with water, holding salts in solution, would become conductors of electricity; and rocks containing different aqueous solutions (and very different I have often found them to be, not only in neighbouring mines, but even in different parts of the same mine) would be exciters or generators of electricity; and if rocks of the same nature may be thus influenced by the saline matter contained in their minute fissures and pores, it is reasonable to suppose that rocks differing from each other, and so circumstanced, might produce a greater electrical action. Other causes may have operated, and may still operate, in exciting electric or voltaic currents under the earth's surface. Ampère has attributed the terrestrial magnetism to the circulation of currents of electricity round the globe from east to west, and this opinion has been adopted by most philosophers. However this may be, it is evident from the laws of the electro-magnetism, that the direction of such currents, whether considered as the cause or the effect of terrestrial magnetism, would, at least, be in harmony with it; that is, the electricity would have a tendency to pass from magnetic east to west, or, in other words, at right angles to the plane of the magnetic meridian (this was demonstrated by an experiment); and hence voltaic currents might have been energetic in the east and west fissures, and not in the north and south ones; and should no fissures have occurred within thirty degrees on either side of the magnetic east and west, for the time being, still the voltaic currents would, *ceteris paribus*, traverse those fissures which most nearly approached that direction. It should, moreover, be observed, that between two and three centuries ago, the magnetic needle had an eastern variation, whereas now it is nearly twenty-five degrees and a half to the westward of the true north in this part of Cornwall. It is supposed that the needle in London has been for nearly twenty years returning towards the true meridian; at Falmouth, however, I have not been able to detect an diminution in the variation; on the contrary, it appears to me rather to have increased during the last two years. Thus it seems that considerable deviations from the magnetic east and west in the direction of metalliferous veins cannot be urged as an objection to the hypothesis. This is, however, I understand, the prevalent bearing throughout the world. [This was shown by a diagram.] Such voltaic currents acting on the saline contents of the fissures would materially tend to decompose and deposit them there, the metal being determined towards the negative pole, and the acid to the positive one. [This doctrine was illustrated by an experiment.]

"Silex forming silicates with the metals, and also combined with the alkalies, would likewise go in the direction of the acid, and it may be inferred from the prevalence of quartz in the veins, that the metallic silicates might at one time have abounded. If, however, silex be in combination with fluoric acid, it will be collected at the positive pole.

"It is well known to miners that the productiveness of veins is greatly influenced by the rocks which they traverse. Now, this fact is in strict accordance with the theory which would lead us to expect to find an accumulation of the metals in one place, rather than in another; that is, in the electro-negative, rather than in the electro positive rocks. I could not, however, for some time reconcile with this general property of metals, the frequent occurrence of tin ore (the peroxide of tin) in distinct veins from the copper ores, however contiguous they might be, as well as the opposite positions of these metals when co-existing in the same vein.

"This difficulty was at length solved by a very simple experiment, from which I found that when the muriate of tin, in solution, was submitted to voltaic action, part of the tin, in the state of a metal, was deposited at the negative pole, and the other portion, in the state of a peroxide, at the positive pole. Thus this *prima facie* objection to the theory, turned out to be a satisfactory confirmation of it.—(An experiment was introduced to illustrate this doctrine.)

"Copper is determined to the negative pole, and so is iron, which seems to explain why iron ochre, assuming the form of "*gozzan*," occurs with copper ore, and not often, I believe, in tin veins, in the strict sense of the word. I have, moreover, very closely imitated the appearance of "gozzan" by long continued voltaic action on copper ore, placed in a solution of the sulphate of iron. Judging from analogy, I have no doubt that the earthy matter which frequently accompanies tin ore, such as chlorite, or "*peach*," and is considered by the miners as unfavourable to copper, would be found to have an affinity for the positive pole. Quartz has, under most circumstances, the same tendency; and hence, I doubt not, has arisen the superior hardness of tin lodes, and of their walls, termed "capels." In the case of copper lodes, I should expect, *à priori*, to find the walls and the rocks immediately adjacent, rather less hard than those of tin lodes; or if one wall should be harder than the other, that it would be the one opposite to, or at the greatest distance from the copper ore. The arseniates and phosphates of metals might also be expected to be found at the positive rather than at the negative pole. If the sulphuric acid should undergo decomposition, the sulphur would be determined, like the copper, towards the negative pole, and the oxygen towards the positive one. It can, moreover, be shown by experiment, that ores may have been modified in their combinations after their deposition: thus I have changed the yellow sulphuret of copper into the grey sulphuret, by a feeble voltaic action continued for some time. In the first place, the yellow copper ore assumes the beautiful irridescent colours of what we term the peacock copper ore, which it is well known is only found in nature when there are flaws in the ore.

"The next stage of its transmutation is a very close resemblance to the purple copper ore, or buntkupererz of the Germans, and finally it becomes grey copper ore; on which (if the process be carried on in a solution of sulphate of copper) native copper is deposited. Our miners are, I believe, generally aware that native, or malleable copper, is not often found in contact with yellow ore, but very commonly with grey or black ore, and in 'gozzan;' and that the grey ore generally occurs nearer the surface than the yellow, and also sometimes in the neighbourhood of cross-courses, as well as in the cross-courses themselves. I have effected this change of the yellow copper ore by connecting it by a wire with a plate of zinc, and plunging them into plain water only. I have also produced it by substituting a piece of grey ore for the zinc, and plunging the yellow ore into a solution of sulphate of copper, and the grey ore into water, the liquids being divided by clay, whereby one of the processes of nature, of which we have such frequent evidence in our mines, is closely imitated.—[Mr. Fox showed the method of doing this, and exhibited specimens.]

"I have enlarged on these experiments, perhaps, more than they deserve, but it has been for the purpose of showing that the arguments founded on the common occurrence of grey ore near the surface, and also of the vitrified appearance of 'gozzan,' in favour of the igneous origin of lodes, are quite inconclusive and untenable. My friend, Andrew Crosse, of Broomfield, in Somersetshire, has produced thirty or forty different mineral substances by long-continued voltaic action; among them, crystals, quartz, carbonate of lime, iron, pyrites, phosphate and arseniate of copper, &c. Becquerel, an eminent French philosopher, had, it seems, preceded him, although unknown to him, in obtaining many of the metallic sulphurets and other mineral substances, by very feeble voltaic action, continued for a considerable time.—These are highly interesting facts, as connected with the present subject, and not the less so from the evidence afforded to us by all the results, that in order to form mineral veins, time is a more important agent than great voltaic power.

"It is not necessary on this occasion to speculate on the sources from which the ores were originally derived; my object being to show, that whatever the source was, their present arrangement appears to be due to electro-magnetic agency. The probability, however, is, that they were contained in the rocks, and carried, in a state of solution, through the cross-courses and cracks into those fissures, in which they were detained and deposited by voltaic action. If the rocks were once impregnated with the ores which are now accumulated in the lodes, their tendency to excite reciprocal electrical action would probably have been thereby increased; and in proportion as these ores became concentrated in the lodes, this action would have experienced a continued augmentation. It may be inferred from the theory, that whilst the arrangement of the contents of the lodes would be materially influenced by voltaic agency, the contents of the cross-courses would be mostly due to mechanical deposite. The effect of this distinction appears to me to be important in connexion with the intersections of lodes, to which I shall presently allude more particularly.—When striated or radiated quartz (cross-course spar) is found in cross-courses, I think that it must be referred to the agency of electricity; but then it does not seem to indicate the transmission of voltaic currents, longitudinally through the fissures, but rather a state of electrical induction, such as arises from the approximation of different bodies to each other. Thus, if the walls of the cross-fissures partook of this property, they may have influenced the striated arrangement of the crystals of quartz, nearly at right angles to the walls of the fissures, one extremity of the quartz crystals having been attracted by one wall, and the other by the opposite one. The mechanical deposits in lodes also are more or less abundant, and must have continually tended to modify the results which would have been produced by undisturbed electrical action. I will refer to some of them.—[Here Mr. Fox exhibited a diagram, representing a ground-plan of an east and west fissure, very much contracted, and split into branches about the middle, the east half being in killas, and the other in granite.]—Suppose a voltaic current to have a tendency to deposit the metals within the boundaries of the granite. The contracted part of the vein might in time become filled up with clay quartz, or other substances, so as to stop or check the transmission of the metal, although the electricity itself would pass on, and thus there might, in the contracted part, be a deposition of the metal. This is one case, which, said he, I believe is met with in our mines. There is another fact, equally common, which seems to be due to mechanical interference; I mean that of lodes being generally less productive when their underlie is increased. Now it is evident that whenever this occurs, there will be a better lodgement for the mechanical deposits in those parts of a fissure, than in others where it is more nearly vertical.—[This was illustrated by experiment.]

"Having now endeavoured to show that the existence of ores in veins in certain directions, and of earthy matter in others which cross them, is not incompatible with their contemporaneous origin as fissures, I shall next state why I think that the intersection of the former is perfectly reconcileable with the same hypothesis, if we admit, as I think we must, on the conclusive evidence afforded in our mines, that the fissures from which the cross-courses originated, have, like those which now constitute lodes, undergone a series of openings, or progressive enlargements. Let us assume, that the metals were, for the most part, deposited in the east and west fissures, at an early period in their history, because it is known that the affinities of the constituents of the metallic salts in solution are not so strong as those of the earthly salts, and that, therefore, their deposition by voltaic action would probably proceed more rapidly than that of the earths, and still more so than many mechanical deposits found in lodes. At every successive opening of the transverse fissures, or of the cross-fissures only, the ore and other contents of the east and west fissures, traversed by the former, would be rent asunder, and the rents would be filled up mechanically, by the clay and other earthy matter which would be quickly conveyed from the upper parts of the opposite fissures, by the circulation of the water, &c. Thus, in time, a complete intersection of the east and west veins would be effected, even if no dislocation or heave took place; but if they did, it is unnecessary to show that the intersections would be still more decided.—[Intersections shown by a moveable diagram.]—The dislocation of a lode may have been gradual, or at intervals, like the cracking, or it may, in some cases, have been more sudden. If it took place on the first opening of the fissure, the parallel veins or laminæ of clay, quartz, and other matter, ought, at inconsiderable depths at least, to be clear and decisive; and it is in this case to be presumed, that the broken extremities of the lodes, would excite voltaic currents in the cross-courses, and cause a deposition of ore in small veins, or leaders, between them, as often found to be the case. If, on the other hand, the dislocation or heave occurred after the fissure had widened to nearly its full extent, and been filled up, some stones of ore only, at most, would be found in the cross-course, and these scattered sparingly amongst its other contents; and the indications of slow cracking, derived from parallel veins, would be more or less confused and indistinct, or they would even perhaps be obliterated, if the heave were very considerable. When lodes are heaved, it may readily be conceived that the consequent disturbance and fracture of the rock, would give rise to numerous minute cracks; and hence may have originated the small veins or branches of ore, which are, I understand, not unfrequently observed near the dislocated parts of lodes.—[A diagram was here referred to, showing the dislocation of lodes.]

"In the case of vertical and underlying lodes occurring near together, or if the underlie be at very different angles, it will be easy to ascertain the direction and degree of the dislocation or heave. Thus if the motion be vertical, whether subsidence, or elevation, a vertical lode will not indicate any heave; whereas in an underlying lode, its effect increases in proportion as the inclination of the lode increases. A diagonal movement, on the other hand, would not be indicated by a lode having the same inclination, but it would produce its greatest effect on a lode at right angles to the direction of the movement; whilst in the case of a vertical lode, the dislocation or heave would be a mean between the two. A movement in a horizontal direction, if such can be admitted, would produce an equally horizontal heave in every case. These are perhaps obvious consequences, but certainly they have been but little attended to in this country. Probably, for instance, there are not many persons who are prepared to say what has been the direction of the movement of one of the walls of the great cross-course which has produced the extensive shift or heave of the lodes in Gwennap, whether vertical or oblique, and yet nothing is more easy than to decide this question. It is true that there may have been different movements, but this can be ascertained, or the phenomena may possibly be due to an elevation, and not to a depression of the strata.—[Mr. Fox again introduced diagrams to illustrate his meaning.]

"It may sometimes happen that an apparent break in a lode may have arisen from a fissure having taken a zig-zag direction originally; and in this case it will be difficult to distinguish from a real dislocation, except by its not agreeing with other dislocations on each side of it.—[Illustrated by a diagram.]—It very often, if not generally, happens, that the hanging wall of a lode appears to be *lower* than the interior one. This is exemplified by the intersections of tin lodes by those of copper, when they meet underlying in different directions, or at different angles, the tin lode having usually the appearance of having been thrown up at its point of contact with the foot wall. It has been already remarked that tin lodes are generally harder than those of copper, wherefore it may be readily supposed that the latter would more readily yield to any tension than the former, and might from time to time be further widened, whilst the tin lodes would remain unchanged in this respect. Then the shift of the tin lode is very inconsiderable, it may be due merely to the horizontal separation of the walls of the copper lode.—[This was illustrated by a diagram.]—In many cases, however, there is doubtless a partial subsidence of the hanging wall, or rather perhaps of a mass of it, which may be detached from the main body of the rock or country by its own weight. In some instances, the apparent upheaving of a tin lode may be caused by an increase in the underlie of both walls of a copper lode; and as copper lodes are generally much less hard than those of tin, it might readily be supposed that the former would be progressively opened for a much longer period than the latter.—[Explained by a diagram.]—This is an evident result, and appears satisfactorily to explain why tin lodes are intersected by those of copper.

"It seems to me, that many other apparent difficulties, which the phenomena of mineral veins present to us, may be solved by the hypothesis of the progressive opening and filling up of fissures. If, for instance, an underlying vein were to undergo a further enlargement, a portion of the hanging wall might be separated, and remain attached or cemented, as it were, to the mineral substances resting on the foot wall; or a mass of rock losing its support, might fall off from the hanging wall from its own weight only. Under these circumstances, it is clear that a fissure would result between the hanging wall and the separated mass; and as the fissure became further enlarged, and filled up, the detached rock would become perfectly divided, or insulated from its original situation, by the branches of the vein, and form what the miners term a 'horse.' Instead of a mass of the rock being separated from the hanging wall on the lode, it might crack from the surface, and form a branch vein nearly parallel to the other. It is likewise evident that it might disturb, and at great depths, under an enormous pressure, probably would materially derange the relative positions of the included parallel veins; and if in some parts of a lode they adhered more strongly to one wall than to the other, the further enlargement or opening of the lode would draw these veins or some of them across from wall to wall in an oblique direction.

"The tendency of the hanging wall of an underlying cross-course to fall against or toward the under foot wall, might, as in the case of a lode, produce a crack from the surface downwards horizontally parallel to the cross-course.—[This was illustrated by a diagram, without which we cannot report Mr. Fox's observations in this part of the lecture.]

"It may be well, perhaps, to recapitulate some of the heads of this communication. I have endeavoured to show,

"1st. That on the known principle of electro-magnetism, voltaic currents will most readily pass, *cæteris paribus*, at right angles to the magnetic meridian.

"2ndly. That different saline solutions, existing in the rocks, are capable of exciting voltaic action, and giving rise to voltaic currents, even if there were no other cause sufficient to produce them.

"3rdly. That such currents will consequently most readily pass through those fissures which have the closest approximation to the magnetic east and west, bearing at the time.

"4thly. That they will tend to decompose any salts held in aqueous solution, and deposit the metal or base at the negative pole or rock, and the acid, or solvent, at the positive pole or rock.

"5thly. That the peroxide of tin has, in this respect, the property of an acid, and is deposited at the electro-positive pole, which seems to explain the cause of the relative position of copper and tin in our lodes.

"6thly. That both the lodes and cross-courses afford evidence of the progressive opening of the fissures.

"7thly. That the theory is in accordance with this evidence, and that it enables us to explain many phenomena observed in lodes, such as the existence in them of insulated masses of rock, termed 'horses,' branch veins, oblique veins in lodes; and the fact of a portion of the vein-stones being generally of the nature of the containing rock, &c. &c.

"8thly. It also supplies a simple explanation of the phenomena of intersections, without attributing the origin of tin and copper lodes, and cross-courses, to different epochs. Thus the more mechanically formed veins seem to intersect those of electro-magnetic formation; and in general terms, the softer veins seem usually to intersect the harder ones.

"9thly. That north and south fissures may sometimes be partly filled with ore by the agency of voltaic currents, generated between parallel east and west lodes.

"In conclusion, it may be remarked, that there is much to excite our admiration even in the arrangement of mineral veins.

"Were not the metals, accumulated as they are, found to be in certain fissures, and in certain parts of those fissures, it might have been almost useless to seek for them; or if, on the other hand, the metals were much more concentrated, they might become too soon exhausted for the service of future generations.

"Were it not also for the numerous veins of clay, mines could not be worked at a considerable depth, from the quantity of water which would flow into them; nor could springs exist near them, at the surface, to supply the wants of the neighbouring population. But who that studies the phenomena of nature, and every where finds proofs of wonderful adaptation and design, can hesitate to believe in the existence of such evidences under the earth's surface to a much greater extent than has yet been ascertained? Man, at the best, can see but a little way, and his powers may more properly be said to belong to the scale of ignorance than of knowledge; for he cannot trace a blade of grass or a fragment of rock up to its primary elements; take what he may, even in the material world, and there are bounds which he can never pass. He knows, however, that there are secondary causes in operation, subtile agents, which manifest themselves by their effects, and which seem to be perfectly adapted to accomplish the ends designed, under every circumstance in which they have hitherto been observed.

"What consideration, then, may we not ask, of a merely physical character is so calculated to impress the mind with the infinite perfections of the Almighty's wisdom and goodness, w..o has created these agents for the benefit of his creatures, and connected them together in the most wonderful and beautiful harmony?"

At the close of the lecture, Mr. Fox read a series of questions on points connected with the subject he had been discussing, which he wishes to be printed and circulated for the consideration of practical miners, with a view to elicit facts which may tend either to establish or refute the correctness of his theory.

A general discussion then ensued.

Mr. Blee said, that lodes were frequently found in strata so soft that the most careful boarding was necessary to prevent their running in, immediately as the ore was excavated; instancing the lodes in Wheal Mary, in Perranzabuloe, the "country" about which is almost in a semi-fluid state; and inquired whether it was possible to believe that fissures could ever have existed in such a place for the reception of the metallic deposit?

The Lecturer replied, that on the principles of electro-magnetism it was easy to suppose, that while one part of the ground was getting hard, another part might be getting soft. In the neighbourhood of many copper lodes, he had found the ground apparently softened. In the Lanescot mines, he had found the ground very soft, while the lodes contained a quantity of quartz.

Mr. Treseder said, he could not understand how the fissures, supposed by Mr. Fox, could have been kept open for the reception of metallic deposit so long as appeared to be necessary, since in the very hardest ground strong pieces of wood were requisite to keep open the excavations made by miners in a lode.

The Lecturer, in answer, said, that as the country cracked slowly asunder, stones might fall down and keep the fissure partly open; and he supposed this opening to be filled up by metallic deposit and mechanical substances. When filled up, a further cracking might take place, allowing other stones to fall in, affording fresh fulcra of resistance to the tendency of the earth to close, the new openings being again filled as before.

Mr. Blee said he had no difficulty in believing Mr. Fox's theory satisfactory, as far as respected the hard stratum of which Mr. Treseder had spoken; and that if a single case could be adduced of mechanical deposits found in such soft ground as he (Mr. B.) had first mentioned, his objection would be immediately removed.

Mr. Treseder asked how, on Mr. Fox's theory, he could account for lead lodes being found at right angles with the direction of the copper lodes?

The Lecturer said, that lead did not always take the direction of north and south, and instanced the lead veins in Wales, Yorkshire, and Derbyshire, where lead was the predominant metal, and where the veins ran usually east and west. He was not prepared to account for its taking a different direction in the neighbourhood of copper veins; but he supposed it owing to secondary currents of electricity acting at right angles to their usual direction, and producing these lead and copper veins at right angles to each other, their relative directions being determined by their relative masses, for where copper was predominant it took the east and west direction; but, in places where lead predominated, the lead took that direction, *the copper being found at right angles to it.*

The Lecturer replied that they invariably, more or less, participated in the character of the general lode.

Mr. Envs said, that in a lode at Trewavas, about two feet wide, he had observed no less than twenty-five layers, any one of which, if detached from the rest, would have passed for a quartz lode.

Mr. Grylls inquired whence the copper could have been derived for the filling up of the cracks Mr. Fox imagined to have taken place in the earth, and if the Lecturer knew an instance of copper being found in strata, not in the immediate vicinity of a lode?

The Lecturer said, that he had stated that he did not pretend to give a decisive opinion, because it was not material to his views from whence the ore was derived; his only business was with the arrangement. The Lecturer then referred to a part of his lecture which treated of this subject.

Mr. Magor, the chairman, here invited observations from practical miners, and expressed a hope that, whereas they had hitherto trusted to the chapter of accidents for the discovery of metals, on the principle of the old adage, that "Where the ore is, there it is," they might hereafter have the light of science to guide them in their researches.

Mr. Grylls said that he had lately picked up a pebble on the shore, in the veins of which he had observed a complete fac-simile of the lodes, cross-courses, and "heaves" found by miners under ground, and asked if the Lecturer thought that the formation of these veins was to be referred to the same causes as produced the deposit of lodes in the fissures he had supposed.

The Lecturer observed that, where dislocations in the strata had taken place, the walls in falling must have broken into many small stones, and have produced many minute fissures. He had found very small fissures, some partly, some entirely filled, and others actually in course of being filled. One specimen in particular which his friend (alluding to Mr. Envs) had in his possession, was but half filled with crystals of quartz, some entire, some but partly formed. It would be well that little things of this kind were more attentively noticed; for by a close observation of seeming trifles, we might be able to discover how nature operated on a grander scale.

Rev. J. Punnett here remarked, that we must not suppose when we see any apparent discrepancies in the great catholic operations of nature, that they are not to be accounted for because no such results are produced in our laboratories, where we operate with every advantage. The chemical operations of nature were frequently modified by mechanical accidents.

Sir Charles Lemon rose, and after paying the Lecturer the compliment of saying he considered that a greater abundance of thought had never been concentrated into any paper, observed that he was sure the meeting would be pleased to hear that Mr. Fox had authorised him, as the President of the Polytechnic Society, to state that the lecture would be published in the forthcoming volume of the Society's transactions. By that time he hoped the question Mr. Fox had proposed would be augmented and circulated through the same medium.

Mr. Grylls said he had been requested to ask if the formation of horizontal beds of ore might be accounted for on Mr. Fox's theory, with such a weight of superincumbent strata as must have resisted the opening of horizontal fissures.

The Lecturer said that copper and lead did occasionally occur in beds; but whether between the strata, or in regular fissures, he did not know. There were, however, tin floors, which he supposed had been formed by the falling over of certain beds of rock, but without seeing the spot, and examining the surrounding indications, he could not give a decided opinion.

Captain Truran said that lodes sometimes were found without the usual walls, and asked how the Lecturer accounted for this circumstance.

The Lecturer replied, that if the overhanging "country" was not very hard, it would naturally crumble down. Indeed, all "country" would have that tendency, and where the ground was particularly soft there might not be the least trace of a wall.

The Chairman, on the motion of Mr. Blee, thanked the Lecturer, in the name of the Institution, for the very great kindness he had shown in reading his lecture to them.

The Lecturer replied, that if any good resulted, he should have accomplished the object he had had in coming there, and would feel himself amply rewarded.

[We are indebted to the columns of the *West Briton* for the report of the proceedings at the meeting at which the interesting lecture of Mr. Fox was delivered. The scientific world are much indebted to this gentleman; and it would be pleasing were other gentlemen of science to communicate as freely the results of their labours.]

THE ARCHITECTURAL SOCIETY.

This institution commenced its public meetings last week, at its establishment in Lincoln's Inn-fields. This is the first organised society of architects which has hitherto been established in England, at least since the memorable period when that accomplished architect, Dr. Chambers, and his worthy companions, the community of Gothic builders and carvers, left this country and their splendid works, to the perverse Vandalism which, originating in the reign of the tyrant Henry, are too often traced, in even this enlightened age, by their love of destroying all they can get at of the remains of our former grandeur and skill in architecture.

It is, therefore, only after a lapse of about three centuries that we find a rational attempt made to restore to the study of architecture its legitimate modes and sound principles. It is no doubt true, that the establishment of the Royal Academy gave a rallying point to the scattered principles and desultory studies by which, with two or three fine exceptions, the existence of this noble art was with difficulty preserved amongst us. The assistance, however, which could be given by that institution at any time, never could be sufficient for the increasing demands of progressing civilisation; and this society appears to have emanated naturally from the real requirements of society; and its chief objects are, to give the junior members of the profession, of whom it is chiefly composed, opportunities of studying the best principles of their art as to construction, combined with those of good taste in design. Theirs is the season of life to imbibe knowledge and to give a right direction to the mind, and thus to be prepared honestly to follow up their elegant and most useful art, to their own honour and that of their native land, for ages to come.

The society contains at present about eighty members, amongst whom are several distinguished men, of advanced years in the profession, whose presence and advice tend materially to promote the objects in view. It also allows a certain number of amateur architects to become members; but the council and all the officers must be practical men. The business-like propriety of this mode is obvious; it keeps the business of the society in the hands of its natural guardians, and is liberal in the admission of those who are likely to promote its views, but who cannot do any harm by interfering in its management.

The attendance of members and visiters was greater than at any former meeting, and the display of original drawings was very splendid. At nine o'clock, Mr. Clarke, the president, took the chair, and the newly-elected honorary secretary, Mr. Brown, read the list of donations of books, prints, antiques, &c., since the last session, with valuable communications from eminent men, such as Sir M. A. Shee, Sir J. Soane, Sir R. Smirke, &c. After the report was read,

The President addressed the meeting, chiefly to explain the nature of its constitution and objects to those present who were previously unacquainted with them; and he took occasion to revert to some former proposition which had been entertained for the purpose of uniting this, the present society, with another of a more recent date, which styles itself "The Institute of Architecture;" but he expressed much satisfaction that the proposed union had not taken place, as the objects of each society were so different, that no good could be expected from such a conjunction. In these sentiments the speaker was borne out by the applause that followed.

In the course of the evening a very handsome silver cup was produced, which had been presented to Mr. George Mair, the late honorary secretary to the society. It is in an elegant style of design, and had an elegant, and we believe just, inscription engraved on its centre. The company was very select, and lingered until near midnight in the rooms.

Commerce.—Brought down on the Monmouthshire Canal and Tramroads, in the quarter ending 30th June:—

		Tons.
	Coal	110,546
	Iron	36,700
Quarter ending 30th September	Coal	125,745
	Iron	33,462

—*Merthyr Guardian.*

Apparatus for showing the Combustion of the Diamond.—Dr. Murray, of Edinburgh, has invented an apparatus for exhibiting this curious process. A glass globe is filled with oxygen, obtained from oxy-muriate of potassa over mercury. A portion of the stem of a tobacco-pipe, attached to the curved end of a wire, fastened to the cork above, carries the diamond, fixed in a nidus prepared for it. The diamond is kindled by the oxy-hydrogen blow-pipe; or a stream of oxygen, urged over the flame of a spirit-of-wine lamp, and then conveyed into the globe. When the combustion of the diamond ceases, lime-water is passed over the recipient; and the weight of the carbonate of lime, formed and precipitated, indicates the quantity of diamond consumed.

Copper.—A valuable mine of copper has recently been discovered in the forest of Tronçay, in the Nievre, and a company is being formed for the purpose of working it.

IRISH MINING OPERATIONS.

[*Continued from No. 61.*]

While the sinkings are going forward, it is usual to carefully select the most advantageous situation for the commencement of a whim and engine-shaft, which, in most cases, is sunk of sufficient size to be divided down the centre, to act on one side as a whim or drawing shaft, and on the other to hold the pumps and general pit-work; also the ladder-way. The size of the shaft must depend upon the dimensions of the pit-work, &c., and the probable quantity of ore and stuff expected to be drawn up it. This shaft should be placed in such a position, with regard to the underlie of the lode, as to intersect it perpendicularly, say at 50 fathoms deep, and the workings must be connected with it in their progress downwards at every ten fathoms; for instance, where the sinkings under adit are down ten fathoms, and a level driven from them on the course of the lode as far as advisable, the first cross-cut is driven to the new shaft, and the ore, &c., raised to that depth, is conveyed through it to the shaft, to be drawn up to "grass," and this is called the ten fathom level (it being usual to date the depth of levels from the number of fathoms they are under the adit). From the ten-fathom level we now commence another set of sinkings, from which, when down ten fathoms, are extended similar levels, and a cross-cut to the shaft, which becomes the twenty-fathom level; and this process of sinking, driving, and cross-cutting to the drawing shaft, is pursued while the lode continues to prove valuable in its returns, and until the shaft has gone through the lode to such a depth that the cross-cuts become too long to render it advantageous to continue sinking it; in which case, for the more effectual working of the mine, a new shaft must be sunk in a situation so as to command the discharge of the ore, &c. to such further depth as the experience of the parties suggests; and it may here be remarked, that the number of shafts, and their connexion with the working or productive portions of a lode, in general depend on each mine's peculiar prospects and local situation.

The adit level being twenty fathoms under the surface, and the shaft just described sunk so as to go through the lode at fifty fathoms deep, the mine is now furnished with a perpendicular means of discharging the produce broken from three levels, viz. the 10, 20, and 30 fathom; and the downright direction of the shaft can, in most cases, be advantageously continued for two levels, or twenty fathoms deeper, and two levels may be extended having cross-cuts driven to the shaft from a contrary direction to the upper ones, which brings the mine down to the fifty-fathom level, or seventy fathoms from the surface.

The driving of levels, or sinking of shafts, are done by the miners at a price according to agreement per fathom, for which price they also find or pay for all materials used in executing the work, such as gunpowder, candles, tools, smith cost, and cost of wheeling and drawing what they break to grass. This is called "tutwork," and it is usual when a miner is asked how he is employed, to say he has a "tut-bargain" if he is sinking or driving, or "on ore" if he is raising ore by the ton. Bargains set on ore are worked in the following manner:—The lode being opened and divided by the different levels into various compartments, generally called "backs" or "stopes," is portioned into bargains or spaces for the different sets of miners to work on, varying in extent according to the number of men in each partnership, which generally consists of from four to nine, each set being divided into corps, which relieve each other every eight hours, so that the work under ground is carried on night and day, it being always desirable in mining to do as much work in a given space of time as possible; the expense of pumping water, agents' salaries, and the numerous incidental charges being nearly the same, whether a mine is fully manned or not.

Ore bargains are set either by the ton, or upon tribute; in either case the miners agree to deliver the ore clear of all charges for drawing, dressing, and the other mine costs before described. If the bargain is by the ton, the price agreed upon for a certain produce is subject to a rise or fall, if the produce or per centage of the ore delivered proves over or under the sample contracted for; and if upon tribute, the miners are paid by a certain proportion of the amount their ore sells for, deducting first the charges for carriage, freight, &c. The latter method does not appear to answer as well in Ireland as in Cornwall, where the mines are so extensively concentrated, that the copper buyers can, with convenience, attend the sales of ore, on and in the neighbourhood of the mines. Bargains by the ton are, therefore, principally made in this country.

E. B.

Mineral Productions and Quarries of France.—From a statement of the produce of the French mines in 1834, it appears that the number of workmen employed in the iron-works of every description, was 38,000; in other metals, 22,939; and in the stone quarries, 75,000. The value of the manufactured iron amounted to 107,415,756fr., about 4,475,656*l.* sterling; that of other metals, to 14,507,245fr., or 604,468*l.*; and of freestone, slate, &c. to 35,260,536fr., or 1,469,189*l.* The number of iron mines in working was, 2,162; of those not worked, 471; blast furnaces, 409 in work, and 93 not in work.—*Annales des Mines.*

Greenwich Railway.—This company is now receiving upwards of 50*l.* per diem for traffic, and on Sundays upwards of 450*l.*, though passengers have to walk from London-bridge to Bermondsey-street. Fifty pounds per diem make 18,250*l.* per annum, the interest at four per cent. of 456,250*l.*, nearly the capital of the whole line. Considering passengers have to trudge from London-bridge to Bermondsey-street, and are then set down at Deptford, this may give a tolerable idea of what may be expected when the whole line is opened. "Why is it not opened?" the public repeatedly asks. We have inquired, and cannot find.—*Railway Magazine.* [We think the editor has lost sight of the expenses. It is, undoubtedly, not however a fair criterion as to what may be the receipts when the railway is completed. Why it is not opened, we think has been already satisfactorily explained.—Ed. M. J.]

Danube and Maine Canal.—The digging of the ninety-third division of the Louis Canal, being 8674 feet, was commenced on the 1st of July last, and is now completed. The earth requisite for the formation of the banks amounted to 3,547,692 cubic feet, and was partly acquired by excavating the canal, and partly taken from the adjoining fields. The banks are already, for the most part, sown with rye and lucern, and their green surface presents an agreeable aspect; the borders will in a few days be planted with fruit trees. The construction of the sluice No. 93, is also fast proceeding, in conformity with the orders of the President of the Committee of Inspection, Baron Von Pechmann, to whose activity and energy the rapid progress of the works may be attributed. The construction of these sluices will be carried on upon new principles, resulting from the observations of the engineer, by which much will be gained; for, instead of employing piles for the foundation, as heretofore, it will be made of chalk, which, by a chemical process, can be hardened under water; it also furnishes another advantage, by rendering it no longer necessary to drain off the water entirely. From this, it is evident great expense will be saved; for very considerable sums have hitherto been employed in this service, especially in forming sluices in the neighbourhood of rivers. We have already intimated, on a former occasion, that these sluices will be completed in the course of next year, which the continued rapid advancement now fully confirms. In a few days the works of the ninety-first and ninety-second division will be commenced, and the result will prove that the completion of the line of canal between Bamberg and Nuremburg will be accomplished much sooner than was at first anticipated.

A Peruvian City.—The town of Pasco, in Peru, is situate on the western side of the Cordillera, at the height, it is said, of 14,278 feet above the level of the sea. The population of the town varies according to the state of the mines; the average number may probably be from 12,000 to 16,000, but is subject to great fluctuation. It has two squares, in one of which is a cathedral somewhat resembling an English barn; the streets are dirty and irregular; the suburbs, a confused collection of mud cottages. The mouths of the mines are frequently in the middle of the streets, which makes walking in the night very dangerous. They are sometimes enclosed in the courts and yards of the houses. The greater part of these, though perfectly useless and unproductive, are thus left unfilled up, to the nuisance and danger of the inhabitants.—*Quarterly Review.*

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